one member selected from the group consisting of Ni: 0.4% or less, excluding 0%; V: 0.4% or less, excluding 0%; Mo: 0.05 to 0.5%; and Nb: 0.05 to 0.5%; and a remainder consisting essentially of Fe and inevitable impurities; wherein: the steel wire has a prior austenite grain size number of 11.0 or larger; and a ratio ($\sigma_{0.2}/\sigma_B$) of 0.2% proof stress ($\sigma_{0.2}$) to tensile strength (σ_B) in the steel wire is 0.85 or lower" (emphasis added). Hashimura and Metals Handbook do not disclose or suggest such a wire.

As indicated above, claim 1 requires that the steel wire has a prior austenite grain size number of 11.0 or larger. The Office Action concedes that Hashimura does not disclose or suggest a steel wire having a prior austenite grain size number of 11.0 or larger. *See* Office Action, page 3. However, the Office Action asserts that it would have been obvious to modify the steel wire of Hashimura to have such a prior austenite grain size number, in view of the disclosure in Metals Handbook that increased prior austenite grain size in high-strength steels may have a detrimental effect on resistance to fatigue cracking. *See* Office Action, page 3; Metals Handbook, page 5. Applicants respectfully disagree.

As correctly pointed out in the Office Action, Metals Handbook discloses that "[i]ncreased prior austenite grain size in high-strength steels may also have a detrimental effect on resistance to fatigue cracking." *See* Metals Handbook, page 5 (emphasis added). However, Metals Handbook does not disclose that increased prior austenite grain size in high-strength steels necessarily has a detrimental effect on resistance to fatigue cracking.

The above-quoted passage of Metals Handbook is made with reference to R.O. Ritchie, "Near-Threshold Fatigue-Crack Propagation in Steels," Int. Met. Rev., Vol. 24 (No. 5, 6), 1979, p 205-230 ("Ritchie") (copy attached). Ritchie discloses two cases relating to increasing prior austenite grain size. In the first case, coarsening prior austenite grain size by almost an order of magnitude (20 μm to 160 μm) decreased near-threshold growth rates. *See* Ritchie, page 216, right column, lines 12-16, FIG. 11 (steel type: 300-M). In the second case,

coarsening prior austenite grain size by a similar magnitude (30 μm to 90 μm, 150 μm and 180 μm) increased near-threshold growth rates. *See* Ritchie, page 216, right column, lines 16-19; FIG. 12 (steel type: Fe-4Cr-0.35C). These two cases reveal contradictory effects of prior austenite grain size on resistance to fatigue cracking.

With respect to the above-described contradiction, Ritchie states that "[s]everal explanations have been proposed to explain the grain-size effect, none of which is entirely satisfactory." *See* Ritchie, page 216, right column, lines 24 to 35. Accordingly, at best, the teachings of Ritchie (and thus the teachings of Metals Handbook) reveal that, for different types of steel, prior austenite grain size has different effects on fatigue/crack growth.

TABLE 1 below provides a comparison between the composition of the steel wire of claim 1, the composition of 300-M steel (first case in Ritchie discussed above) and the composition of Fe-4Cr-0.35C steel (second case in Ritchie discussed above). *See also* Material Property Data Sheet for 300M Alloy Steel (copy attached). As shown in TABLE 1, 300-M steel is an alloy steel having lower content of carbon and chrome and higher content of nickel that the steel of claim 1 (also different from steel of Hashimura). On the other hand, Fe-4Cr-0.35C steel is an alloy steel having lower content of carbon and higher content of chrome that the steel of claim 1. Neither of these steels has the same composition as the steel of claim 1 (also different from steel of Hashimura). Accordingly, the effects obtained in the steels of Ritchie are not predictive of the effects that would be obtained in a steel having the composition, e.g., claim 1 or Hashimura. One of ordinary skill in the art could not determine from the disclosures of Metals Handbook and Ritchie whether it would be desirable to increase prior austenite grain size or decrease prior austenite grain size of such steels to improve resistance to fatigue cracking.

Table 1

Steel Type	C	Si	Mn	Cr	Ni	V	Mo	Nb (%)
Present	0.53	1.2	0.2	1.4	0	0	0.05	0.05
invention	-0.68	-2.5	-1.5	-2.5	-0.4	-0.4	-0.5	-0.5
300-M	0.38	1.45	0.6	0.7	1.65	0.05	0.3	
	-0.46	-1.8	-0.9	-0.95	-2	--	-0.65	
Fe-4Cr-0.35C	0.35			4				

Applicants further note that FIG. 13 of Ritchie shows that the prior austenite grain size numbers for the 300-M alloy steel (shown with -○-) and the Fe-4Cr-0.35C alloy steel (shown with -●-) are less than 9.[#] It is not apparent from Metals Handbook and Ritchie how prior austenite grain size affects resistance to fatigue cracking when the prior austenite grain size number is equal to or greater than 11.

As is well-settled, a *prima facie* case of obviousness based on a proposed modification to a reference (e.g., increasing the prior austenite grain size number of the steel of Hashimura) will only stand if one of ordinary skill would have had a reasonable expectation of success upon making the modification. *See, e.g.,* MPEP §2143.02 (citing *In re Merck & Co., Inc.*, 800 F.2d 1091 (Fed. Cir. 1986)). One of ordinary skill in the art would have had no reason to expect that the steel of Hashimura would have desirable resistance to fatigue cracking if modified to increase the prior austenite grain size number.

A *prima facie* case of obviousness has not been made.

As explained, claim 1 would not have been rendered obvious by Hashimura. Claims 2-6 depend from claim 1 and, thus, also would not have been rendered obvious by Hashimura. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

[#] It should be appreciated that prior austenite grain size numbers defined by ASTM as in Ritchie are equal to prior austenite grain size numbers defined by JIS as in the present application.

Double Patenting

The Office Action provisionally rejects claims 1 and 2 under the judicially created doctrine of obviousness-type double patenting over claims 1-4 of U.S. Patent Application No. 10/550,019 in view of Metals Handbook. Applicants respectfully traverse the rejection.

Claims 1-4 of the 019 application, like the disclosure of Hashimura, do not require a prior austenite grain size number of 11.0 or larger, as required by claim 1 of the present application. Applicants submit that the citation of Metals Handbook does not remedy the deficiencies of claims 1-4 of the 019 application for at least the reasons discussed above with respect to the rejection over Hashimura and Metals Handbook.

As explained, claim 1 of the present application is not obvious over claims 1-4 of the 019 application. Claim 2 of the present application depends from claim 1 and, thus, also would not have been rendered obvious by claims 1-4 of the 019 application. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

Conclusion

For the foregoing reasons, Applicants submit that claims 1-6 are in condition for allowance. Prompt reconsideration and allowance are respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.
Norman F. Oblon

Jacob A. Doughty
Registration No. 46,671

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 08/07)

Attachments:
Copy of Ritchie
Copy of Material Property Data Sheet for 300M Alloy Steel